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(54) Signalling radio service requirements

(57) A method of establishing transmissions to a mobile station in a cellular radio communications system is described, comprising receiving a signal originating a call at a switch and notifying a network accordingly with a paging message, and supplying the paging mes-

sage to the mobile station, wherein an indication of the radio service requirement is also provided with the paging message. Subsequently, only those cells which fulfil the radio service requirement need be measured, to determine which one is to be used.

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DescriptionField of the Invention

[0001] This invention relates to signalling radio service requirements.

[0002] In cellular radio communications systems (i.e. mobile phone systems), there are many different types of data or information which are required to be transmitted and each of these places different requirements upon the system. A simple voice message, for example, requires a lot less resources than a video call. There is also an effect on the size of the cell which the system must allocate to a particular call.

Background of the Invention

[0003] For a mobile originated call, i.e. a call which is originated at mobile equipment, then the mobile equipment can easily tell the system what sort of call it is making, e.g. a fax call, a video call and so on. The mobile equipment can indicate, when it initiates the call, the service requirement of that call and the network can then determine the cell that is currently available and that is best adapted to support the required service requirement. The service requirement may include, for example, the data rate necessary.

[0004] At present, this type of "service dependent directed retry" can only work for mobile originated scenarios. It is not possible for a mobile terminated scenario. Thus, mobile terminated scenarios generally utilise access and radio resource allocations in a non-optimal fashion, or can take a considerable length of time in which to establish the resources to be used.

[0005] The present invention arose in an attempt to provide an improved mobile terminated scenario for service dependent directed retry.

Summary of the Invention

[0006] According to the present invention there is provided a method of establishing transmission to mobile equipment via a radio network, wherein the radio network provides the mobile equipment with a paging message, information providing an indication of the radio service requirement being provided with the paging message, such that the mobile equipment uses the received information when making access to the radio network.

[0007] Preferably, the mobile equipment informs the radio network of the radio service requirement during an access phase.

[0008] The radio service requirement may be transmitted directly or indirectly.

[0009] Subsequently, the radio network can choose only those cells which are known to meet the radio service requirement, and only these cells need to be measured for selection of one of them for use.

Brief Summary of the Drawings

[0010] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows schematically a previously proposed paging and call set up arrangement;

Figure 2 shows a first embodiment of the present invention; and

Figure 3 shows a second embodiment of the present invention.

Description of the Preferred Embodiments of the Invention

[0011] Referring to Figure 1, a mobile telephone communications system includes one or more mobile stations (MS) 1, a base station sub-system (BSS) 2 and a switching system, or mobile switching centre (MSC) 3. A mobile terminated call is received first by the MSC and this then initiates communication between the MSC, the BSS and the MS which ultimately allocates sufficient resources to the system and then allows communication proper to commence. All this can take considerable time, even before the holder of the mobile station is aware that he is being called.

[0012] One example is shown in Figure 1. An incoming call 4 originating from outside the system (e.g. from a land line) is in this case an ISDN call and thus requires a certain amount of resources, which amount is greater than a normal voice call. The MSC sends a paging message 5 to the BSS and this in turn sends a paging message 6 to the MS. The paging message simply informs the mobile station MS that there is an incoming call which is awaiting resources to be allocated to it. The MS then replies on a random access channel (RACH) 7 and a communications sequence is instigated between the MS and the BSS. At some point 8 during this, the MS obtains measurements of all available cells within the cellular radio communications system which are available and sends this data to the BSS, although at this stage the system is not aware of the radio service requirement, i.e. the size of cell or other parameters related to the required cell, which of course depends upon the type and nature of call to be transmitted. An authentication/ciphering step 9 follows and after this has been achieved, the call is finally set up and resources are assigned at 10 (e.g. a cell with 2 MB bandwidth suitable for the message transmission).

[0013] However, several seconds can elapse during this process and in the meantime the system has had to search for measurements of all possible cells, most of which will probably not have the resources to handle that particular call in any case. This is wasteful and inefficient in terms of time and, not least, battery life. Before the authentication step, the BSS has to provide the mobile terminal with details of all possible cells to meas-

ure, but as it has no indication, at that stage, of the radio service requirement, it has to provide details of all possible available cells.

[0014] Figure 2 shows part of a paging and initiating routine which embodies the present invention. In the case of Figure 2, when an incoming call 14 comes into the switching network MSC, a paging signal is again sent to the base sub-station, BSS. However, the initial paging signal also includes an indication of the "radio service requirement" and this is shown in the example as an indication that a cell having a bandwidth of 2 MB is required. The BSS then passes this information to the mobile station MS within the paging message 15.

[0015] The mobile station then performs access using specific values which indicate to the BSS what radio service requirement is being demanded for the mobile terminated call. The BSS is able from the access value (or information sent later by the mobile station signalling) to determine exactly the internal procedures to perform and the type of system information which will be required. That is, the BSS can inform the mobile station to gather specific information on those cells available which are capable of handling the specific radio service requirement, or whatever type of data is required, at the cell measuring stage, and thus to only look at a smaller subset of the available cells, rather than all the available cells as previously.

[0016] Figure 3 shows an alternative embodiment in which the BSS maintains the context of the paging procedure. In this case, the BSS sends to the MS the value (or part value) to be used on access by the MS. That is, instead of sending the actual radio service requirement, it sends the appropriate values to the mobile station. The radio service requirement is therefore sent 'indirectly'. The MS then sends to the BSS the appropriate value and by decoding this, the BSS can know the radio service requirement by inference.

[0017] Accordingly, in embodiments of the invention, the initial paging signal provides an indication, whether directly or indirectly, of the radio service requirement and that can thereby optimise mobile terminated calls.

Claims

1. A method of establishing transmission to mobile station via a radio network, wherein the radio network provides the mobile station with a paging message, information providing an indication of the radio service requirement being provided with the paging message, such that the mobile station uses the received information when making access to the radio network.
2. A method as claimed in Claim 1, wherein the mobile station informs the radio network of the radio service requirement during an access phase.

3. A method as claimed in Claim 1 or 2, wherein the radio service requirement is directly transmitted with, or as part of, a paging message.
4. A method as claimed in Claim 3, wherein properties of the required cell to fulfil the radio service requirement are directly transmitted.
5. A method as claimed in Claim 4, wherein the required bandwidth of a cell is transmitted.
6. A method as claimed in Claim 1 or 2, wherein the radio service requirement is indirectly transmitted with, or as part of, a paging message.
7. A method as claimed in Claim 6, wherein values are sent with, or as part of, the paging message, which values are indicative of values that the mobile station must return, on an access channel, to the network.
8. A method as claimed in Claim 7, wherein the access channel is a random access channel.
9. A method as claimed in any preceding claim, wherein only those cells capable of meeting the radio service requirement are considered or measured in order to select one of them for use.

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FIG. 1

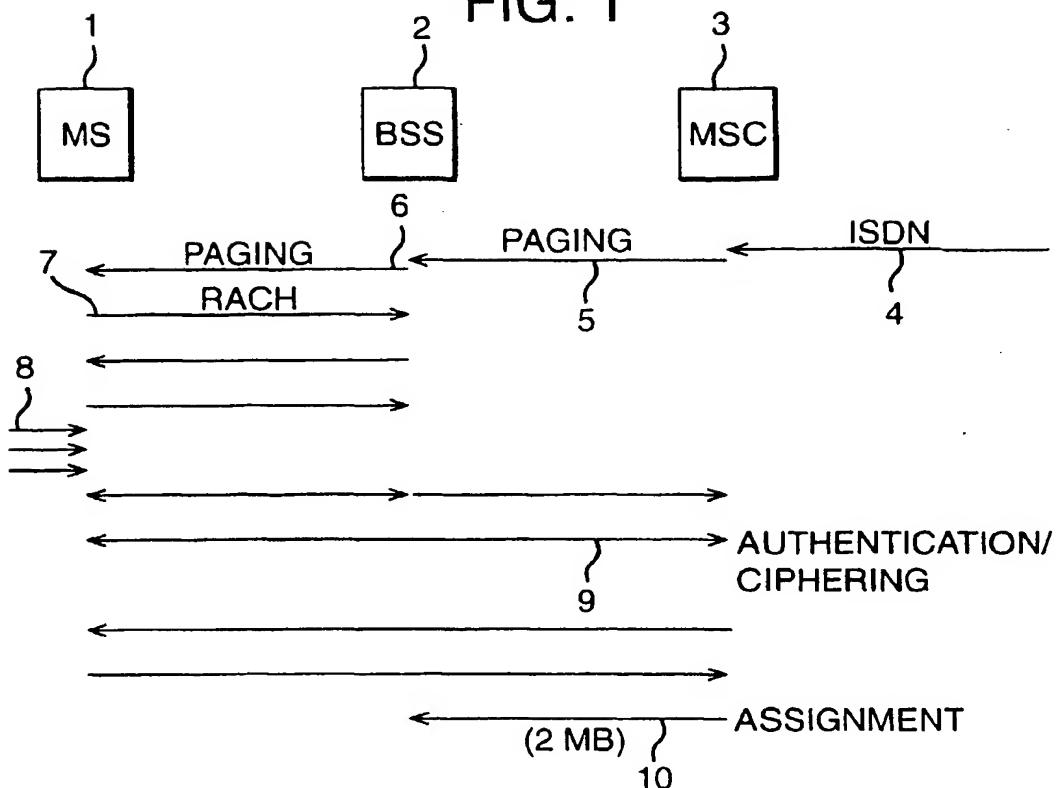


FIG. 2

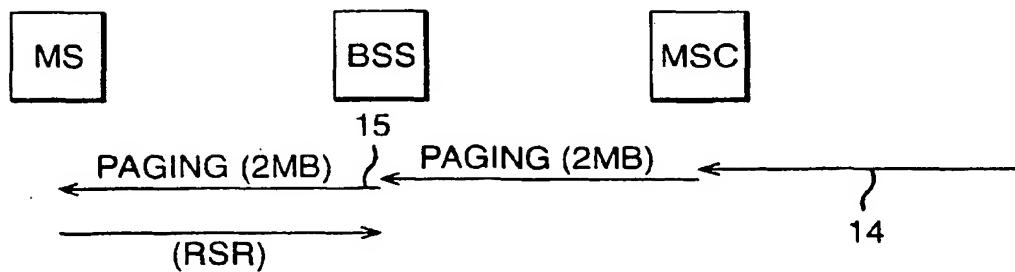
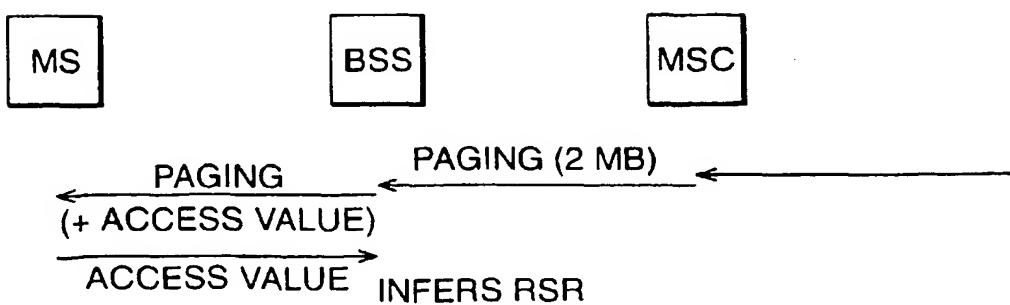


FIG. 3





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 30 4440

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
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A	* page 3, line 18 - page 4, line 3 * * page 6, line 15 - page 8, line 3 *	2-9							
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<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 33%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>10 January 2000</td> <td>Coppieters, S</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	10 January 2000	Coppieters, S
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THE HAGUE	10 January 2000	Coppieters, S							
<p>CATEGORY OF CITED DOCUMENTS</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> X : particularly relevant; if taken alone Y : particularly relevant; if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document </td> <td style="width: 50%; vertical-align: top;"> T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document </td> </tr> </table>				X : particularly relevant; if taken alone Y : particularly relevant; if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				
X : particularly relevant; if taken alone Y : particularly relevant; if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document								

**ANNEX TO THE EUROPEAN SEARCH REPORT
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